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Beiträge zur Kenntnis der Färbevorgänge.

Inaugural-Dissertation
der
Philosophischen Fakultät
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vorgelegt von

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Dichroism of colored fibers.

A great number of optically anisotropic crystals which are not water- clear but are colored in some manner or other show besides double refraction also the phenomenon known by the name of dichroism or pleochroism which is based on the different absorption of two rays polarized vertically with respect to one another. The resultant differences in absorption may be considerable. In many crystals not merely a change in intensity but in the color itself takes place.

Dichroitic crystals may be divided into two groups: in those which are colored without any admixtures (idiochromatic) such as copper acetate, potassium bichromate, iodine, herapathite, many tar dyes and the like, further in those which owe their color at any rate to certain admixtures not as a rule well known such as smoky quartz, amethyst, many tourmalines and the like. Also artificial colorings of crystals have been known for a long time. The earliest example of this was given by Senarmont(1); later artificially colored crystals were made from very different substances(2).

Another group of artificially colored double refracting substances which show distinct dichroism is formed by vegetable and plant fibers when they have been dyed by very different substances (3). Ambronn is of the opinion that dichroism in these cases can only result if the fiber is anisotropic and the coloring

substance dichroitic in its crystals. The anisotropic fiber, according to his opinion, can exert an orienting influence on the penetrating dye particles whereby they will be deposited in the same direction or approximately in the same direction. Fibers so colored should therefore be compared with , say, allochromatically colored crystals which have dichroism. The tests with iodine, Congo red and various other dyestuffs appear to confirm this view. Ambronn found later that colorings of gold and silver too cause strong dichroism on fibers although these metals were known to be crystallizing only in the regular system. Although a dimorphism of gold and silver could not then be directly detected still the assumption was obvious that such existed if dichroism is not to be attributed exclusively to the action of an anisotropic lattice. Through more recent investigations of Ambronn (1) this assumption has been confirmed. It has been possible to produce from solutions of silver nitrate and gold chloride is very small spaces anisotropic and strongly dichroitic crystals so that it must be assumed that in the case of fibers treated with these salts similar crystals would result.

As hitherto there were only substances with comparatively slight dyeing or coloring capacity with which the tests were carried out I have made coloring experiments on a considerably greater number of very different substances and in doing so

special attention was paid to the action of the so-called mordants. The results of these tests will be reported in the following.

There were used:

1. Basic dyes,
2. Acid dyes,
3. direct cotton dyes.

I would like to say in this connection that I have published a report concerning these tests in the Zeitschrift fur Farben- und Textilindustrie, IV, no. 11.

1) Poggend. Annalen, Bd. 91 , 491.

2) O. Lehmann,Molekularphysik I,Leipzig 1888, 428 and ff. also Zeitsch. f. phys. Chemie 8, 543; Wiedemann , Ann. 51, 47; Ambronn, Berichte der Deutsch. Bot. Ges. 7, 113

3) H. Ambronn , Berichte der Deutsch. Bot. Ges. 6, 85 - 94; Ber. der Sachs. Ges. der Wissensch. 48, 613 - 628.

1) Zeitschr. fur wissenschaftl. Mikroscopie, XII, 1905.

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see back for titles of other articles in booklet.

The "Beitrage zur Kenntnis . . . " has 36 pages

pages 1 – 25 (and top of page 26) covers
dyestuffs, methods and Experimental work.

The translated article (Dichroism gefärbter Fasern)
appears on pages 26, 27,

"Beobachtungen an pflanzlichen Faser" (Ramie)
on pages 28, 29 + part of 30.

"Beobachtung an tierischen Faser" (Wolle)
on pag 30 and part of 31.

"ausfarbungen auf Ramiefaser"
on p 31.

"Saure Farbstoffe" and "Direkte Baumwollfarbstoffe"
on p 32

"ausfarbungen auf Wolle" on page 33

"Direkte Baumwollfarbstoffe" on pages 33–36